

Field instrumentation and monitoring for Mercury Isotopes at the Experimental Lakes Area, Ontario, Canada

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Abstract

The Experimental Lakes Area (ELA) is located in a sparsely inhabited region of southwestern Ontario between Dryden and Kenora, Canada. ELA offers researchers a unique natural laboratory for ecosystem monitoring and manipulation. Exposed outcrops of pink granite bedrock characterize ELA. Generally there is thin to non-existent overburden on the ridges with sand and peat in lowlands and wetlands.

This study involved spraying different mercury isotopes to the upland and wetland portion of Lake 658 drainage basin. Automatic and manual water-quality samples were used to characterize base flow and storm water runoff events during the study period. Estimates of mercury isotopic loads were made using the flow volume and concentration data.

Implementing effective water quality sampling at Lake 658 was challenging because of the lack of power, telemetry and access to the sampling sites. Compounding this challenge was that several sites were located at highly impervious “flashy” locations, while the wetland and lake outlet sites were located in backwater-affected locations.

Wireless telemetry was installed to provide “real time” data, which allowed users to change sampling parameters without a site visit prior to runoff events. Water quality samplers were modified to collect “clean” mercury isotope runoff samples. Dataloggers were used to measure and record data from a wide variety of sensors including velocity meters, stage sensors, tipping bucket rain gauges and other meteorological sensors. These dataloggers were also used to trigger automatic water quality samplers.

Biographical Sketch of Author

Dave Owens has been involved in many urban and rural storm-water runoff projects as an employee of the United State Geological Survey in Middleton, Wisconsin since 1989. Many of these projects involved instrumentation and integration of equipment into an effective monitoring system. During his employment he has assisted other USGS offices with instrumentation needs including Minnesota, Virginia, Illinois, Michigan and Hawaii. Dave is listed on a patent for an impervious source area sampler, which was designed to collect sheet flow runoff samples from impervious locations. He received his B.S. degree in Civil Engineering from the University of Wisconsin, Madison.